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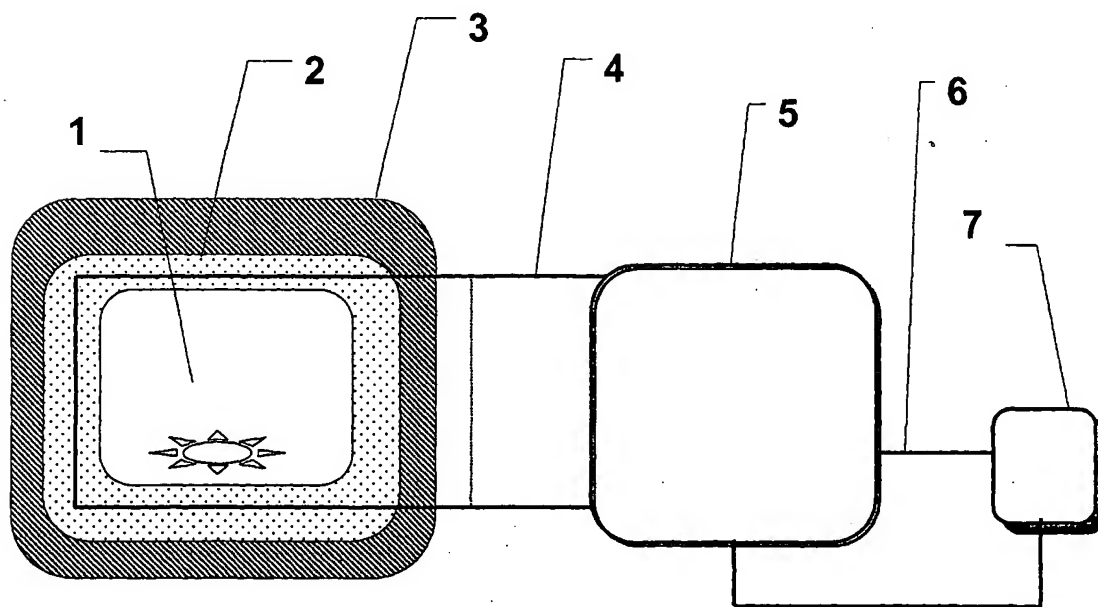
(54) **Fireplace or heat storage stove**

(57) The method of utilizing the thermal energy from the fireplace or stove, the principle of which consists in the fact that the combustion energy is used only for heating up the accumulation reservoir, whereas mentioned accumulation reservoir releases accumulated thermal energy into connected heat appliances.

The fireplace or stove as per the design, the principle of which consists in the fact that all peripheral surfaces forming the hearth of the fireplace or stove (1) are provided with the thermal insulation (3). At the same

time, liquid thermal exchanger (2) is installed between the hearth and thermal insulation (3) of the fireplace or stove (1), which is connected through its secondary liquid circuit (4) with at least one accumulation reservoir (5).

The secondary liquid circuit (4) of the thermal exchanger (2) is advantageously connected into the closed-loop circuit with the liquid circulation allowing a direct connection to the heat distribution circuit and/or the fireplace or stove (1) design includes valve connected with the hot-air heating circuit.



**FIG. 1**

**Description****Field of the invention**

**[0001]** The invention relates to the modification of the fireplace or stove design and method of using the primary heat generated by combustion in the hearth of the fireplace or stove.

**Current state-of-the-art**

**[0002]** Fireplaces, where the primary heat generated by combustion in the fireplace is used for direct heating of the air in heated rooms, are common currently on the market. These fireplaces may be provided with an insert for heating the liquid for the hot nondrinking water or central heating. In addition to this, the fireplaces allow to accumulate the heat generated by combustion in the fireplace body itself and in the chimney including adjacent building structures, from which this heat is radiated even after combustion in the fireplace has been finished.

**[0003]** A combustion system is known from the description of invention CZ 280 436 B6, which consists of the housing fixed in the burner section of the fossil fuel furnace. Mentioned housing includes the first air compartment, inside of which there is the second air nozzle connected to the air supply line, which is connected to the fan coupled with the air line connected through the branch line to the second air nozzle. In the housing there is the first pair of fuel sections with the first group of fuel nozzles, the second pair of fuel sections with the second group of fuel nozzles and a pair of sections for excessive combustion air with a pair of nozzles. The fuel supply line with atomizer is connected to the first group of fuel nozzles, which is connected to the fan outlet. Fuel pipes are connected to the fuel supply line. The first group of fuel nozzles is connected to these pipes through branch lines. The fuel nozzles are connected through the fuel pipes to the fuel supply line through branch lines. Excessive combustion air nozzles are connected by air pipes through branch lines with the air supply.

**[0004]** Description of the protected invention CZ 284 632 B6 concerns the method of heat generation through combustion of fuel in the hearth with several burner levels. The secondary air is blown to the hearth on each burner level and this forms a circulation flow with fixed bottom-up circulation direction. First, second and third circulation patterns of a round shape are determined on each burner level. A flow of fuel containing the primary air is brought to the hearth on each burner level tangentially to the appropriate first circulation pattern. Flow of fuel is brought to the hearth on the lower burner level tangentially to the first circulation pattern, which is bigger than the first circulation pattern on the higher burner level. This ensures formation of a fireball and achievement of the sub-stoichiometric operation of the hearth and thus reduction of NO<sub>x</sub> formation. The fuel supply lines of the combustion system are positioned closer to

the longitudinal axis on the higher burner level than is the case with the lower burner level.

**Matter of invention**

**[0005]** Current fireplaces or stoves do not allow to interrupt heating of adjacent rooms when combustion is still active without energy losses or overheating of such rooms. In addition to this, the current equipment does not allow economical utilization of heat during summer season operation or in houses with the minimum heat consumption.

**[0006]** In addition to fireplaces, there are boilers available on the market, which are designed for various fuels and include various regulation systems for heat utilization and accumulation; these boilers, however, do not have a design nor properties of a fireplace or stove.

**[0007]** Eventual other solutions, such as solutions described in mentioned patent files CZ 284 632 B6 and CZ 280 436 B6, are complicated and more suitable for industrial operations and/or heating of large buildings.

**[0008]** Deficiencies mentioned above are resolved predominantly by the fireplace or stove described in the invention, the principle of which consists in the fact that the combustion energy is used solely for heating the accumulation reservoir from which the heat accumulated is released to connected heating appliances.

**[0009]** The principle of the fireplace or stove consists in the fact that all peripheral surfaces setting the boundaries of the fireplace hearth are heat-insulated and at the same time the liquid heat exchanger is installed between the hearth and thermal insulation, the secondary liquid circuit of which is connected to at least one accumulation reservoir.

**[0010]** Fireplace or stove may be designed advantageously so that the secondary circuit of the heat exchanger is connected into closed-loop circuit with circulation of the liquid allowing direct connection to the heat distribution circuit.

**[0011]** Design of the fireplace or stove may also include advantageous control valve connected with the hot-air heating circuit.

**[0012]** In addition to the above, the fireplace or stove are equipped with usual components, such as chimney body, flaps, grid, heat-insulating transparent face, heat protection elements - fire clay, draught control and so on.

**[0013]** The most significant benefits achieved by using the fireplace or stoves according to the inventions include full utilization of the heat for energy accumulation with the possibility of subsequent precision control of heat appliances in required time, reduction of heat losses, possibility to select heating in fireplace or stove per personal wish and not immediate need of heat. Additionally, the design avoids overheating of rooms or energy losses when heating for longer time than necessary to obtaining necessary amount of heat. This applies particularly to so called low-energy houses, which in this

case allow full utilization of heat generated by combustion in the fireplace or stove also out of the heating season. The invention design also allows installation of fireplaces or stoves with higher thermal power, which reduces the time needed for generation of a sufficient amount of heat for heating of the accumulation reservoirs with simultaneous improvement of esthetic effect of combustion. The design also allows accurate heat control in line with time, personal and/or hygienic requirements regardless of the current thermal power of the fireplace or stove. The invention allows utilization of the fireplace or stove as a low-cost and environment-friendly heat source with a very good possibility of subsequent heat control through controlled utilization of accumulated energy. The above benefits can be evidenced - especially in case of low-energy houses - for example by a fact that the frequency of the accumulation reservoir heating during the winter season will be once a week or two weeks. Esthetic value of the fireplace or stoves according to the invention is improved not only by selection of the size, but also output, which allows full burning with simultaneous fire "flaring". Out of the heating season, the thermal energy obtained from the fireplace or stove can be used only for preparation of the hot nondrinking water, also in the period with high outdoor temperatures. All other technical and esthetic features of the fireplace or stove remain the same.

#### Summary of figures on drawings

[0014] The principle of fireplace or stove modification design as per the invention is clarified in more details through description of its sample version. Enclosed drawing represents simplified schematic diagram of representative design of the stove. In addition to this, connection of the whole heat exchanging system is apparent from the figure.

#### Examples of the invention design

[0015] Stove 1 illustrated by the schematic diagram on attached Fig. 1 includes thermal exchanger 2 installed on the peripheral surfaces, which is filled with unspecified liquid thermal medium, whose secondary circuit 4, or supply and drain pipes respectively, are connected to the accumulation reservoir 5. This accumulation reservoir forms a part of the closed-loop liquid circuit through distribution pipes 6, which includes unspecified heat appliance 7 illustrated only as a block. This appliance may represent e.g. hot-water central heating or any other heat appliance utilizing liquid as a heat exchanging medium. Thermal exchanger 2 is provided with heat insulation 3 on its external surfaces, which ensures accumulation of available heat from the stove 1 in the heat exchanger 2. As a means of simplification, the diagram of the invention design described does not include other commonly known and used elements of heat exchanging circuits, such as heat appliances (e.g.

central heating, etc.), measuring and control elements, and so on.

#### Industrial utilization

[0016] The fireplace or stove as per the invention can be used advantageously as a highly controllable, low arduous, esthetic and low-cost single heat sources especially in buildings with the low total heat consumption, such as low-energy houses. At is possible to achieve a situation that in such houses it will suffice to prepare, at any time of the day, a sufficient amount of thermal energy for heating and preparation of the hot nondrinking water, or for preparation of hot nondrinking water respectively, once a week in the winter season and once every three weeks in the summer season.

[0017] The fireplace or stove as per the invention in connection with other heat source, e.g. electrical heating, solar collector or thermal pump, can be used suitably as a normal heat source in ordinary family houses, restaurants and similar facilities with year-round need of the hot nondrinking water or heating.

#### Key

##### [0018]

- 1 Stove
- 2 Heat exchanger
- 3 Thermal insulation
- 4 Secondary liquid circuit
- 5 Accumulation reservoir
- 6 Distribution pipes
- 7 Heat appliance

#### Claims

1. The method of utilizing the thermal energy from the fireplace or stove, **characterized by the fact**, that the combustion energy is used only for heating up the accumulation reservoir, whereas mentioned accumulation reservoir releases accumulated thermal energy into connected heat appliances.
2. The fireplace or stove as per Claim 1, **characterized by the fact**, that all peripheral surfaces forming the hearth of the fireplace or stove (1) are provided with the thermal insulation (3). At the same time, liquid thermal exchanger (2) is installed between the hearth and thermal insulation (3) of the fireplace or stove (1), which is connected through its second-

ary liquid circuit (4) with at least one accumulation reservoir (5).

3. The fireplace or stove as per Claim 2, **characterized by the fact**, that the secondary liquid circuit (4) of the thermal exchanger (2) is connected into closed-loop circuit with the liquid circulation allowing a direct connection to the heat distribution circuit.

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4. The fireplace or stove as per Claim 2, **characterized by the fact**, that the fireplace or stove (1) design includes valve connected with the hot-air heating circuit.

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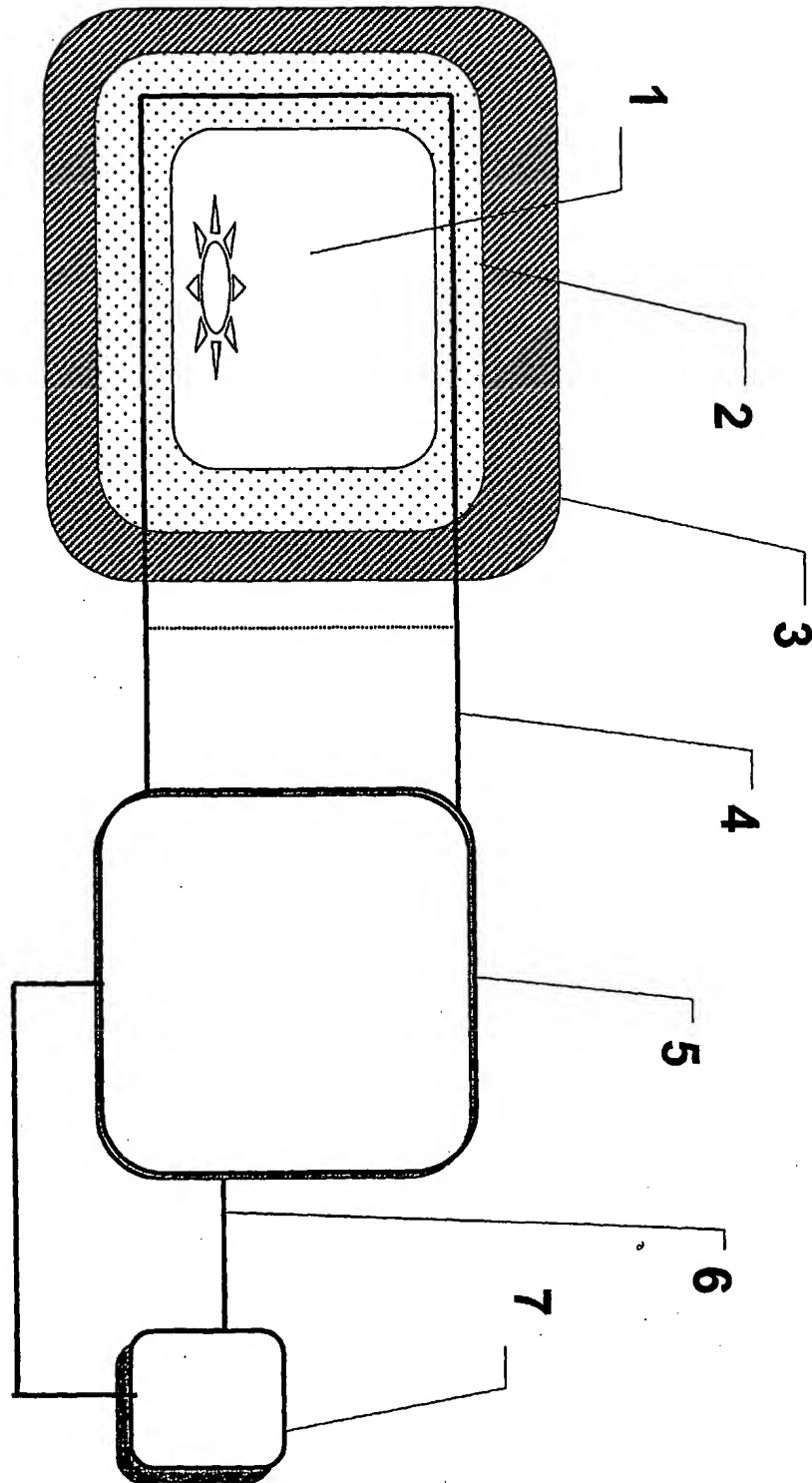


FIG. 1



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 04 46 6012

| DOCUMENTS CONSIDERED TO BE RELEVANT   |  |  |  |
|---|--|--|--|
| Category  | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim                                  | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
| Y   | DE 37 21 454 A (FLANDERKA KARL)<br>12 January 1989 (1989-01-12)<br>* column 6, line 34 - line 38; figure 1 *<br>* column 7, line 60 - column 8, line 23;<br>figure 5 * | 1-4  | F24B1/187<br>F24B1/183                       |
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| A   | US 4 299 178 A (WILSON JOHN W)<br>10 November 1981 (1981-11-10)<br>* column 4, line 46 - line 60; figure 2 *   | 1-3  |  |
|   |  |  | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.7)      |
|   |  |  | F24B<br>F24D                                 |
| The present search report has been drawn up for all claims  |  |  |  |
| Place of search<br>The Hague  |  | Date of completion of the search<br>10 August 2004 | Examiner<br>Vanheusden, J                    |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |  |  |  |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 46 6012

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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10-08-2004

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EPO FORM P0458

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82